DATA SHEET

TDA1016
Recording/playback and 2 W audio power amplifier

Product specification
File under Integrated Circuits, IC01

August 1987

Philips Semiconductors

PHILIPS

GENERAL DESCRIPTION

The TDA1016 is a monolithic integrated audio power amplifier, preamplifier and A.L.C. circuit designed for applications in radio-recorders and recorders. The wide supply voltage range makes this circuit very suitable for d.c. and a.c. apparatus. The circuit incorporates the following features:

Features

- Power amplifier/monitor amplifier
- Preamplifier/record and playback amplifier
- Automatic Level Control (A.L.C.) circuit
- Voltage stabilizer
- Short-circuit (up to 12 V a.c.) and thermal protection.

QUICK REFERENCE DATA

Supply voltage range	V_P		3,6 to 15	V
Supply current; total quiescent at V_P = 6 V	I_{tot}	typ.	10	mA
Operating ambient temperature range	T_{amb}		–25 to 150	°C
Power amplifier				
Output power at d_{tot} = 10%				
V_P = 6 V; R_L = 4 Ω	P_o	typ.	1	W
V_P = 9 V; R_L = 4 Ω	P_o	typ.	2	W
Closed loop gain	G_c	typ.	36	dB
Preamplifier				
Open loop gain	G_o	min.	70	dB
Minimum closed loop voltage gain	$G_{c\ min}$	min.	35	dB
Output voltage at d_{tot} = 1%	V_o	min.	1	V
Automatic Level Control (A.L.C.)				
Gain variation for ΔV_i = 40 dB	ΔG_v	typ.	2	dB
Stabilized supply voltage				
Output voltage	V_{5-16}	typ.	2,6	V

PACKAGE OUTLINE

16-lead DIL; plastic, with internal heat spreader (SOT38); SOT38-1; 1996 July 23.

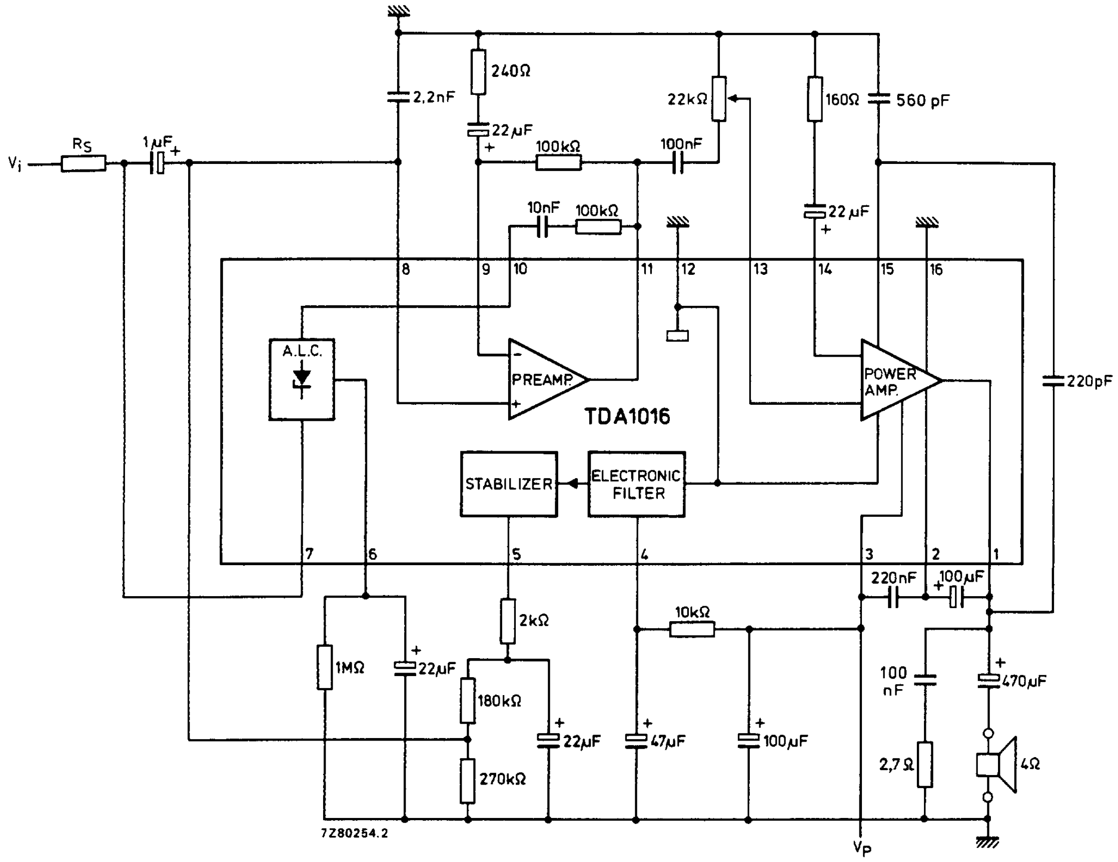


Fig.1 Block diagram with external components; also used as test circuit.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage (pin 3)	V_P	max.	18 V
Repetitive peak output current	I_{ORM}	max.	1 A
Non-repetitive peak output current (pin 1)	I_{OSM}	max.	2 A
Total power dissipation	see derating curve Fig.2		
A.C. short-circuit duration of load during sinewave drive; V_P = 12 V	t_{sc}	max.	100 hours
Crystal temperature	T_c	max.	150 °C
Storage temperature range	T_{stg}		–55 to + 150 °C
Operating ambient temperature range	T_{amb}		–25 to + 150 °C

THERMAL RESISTANCE

The power derating curve (Fig.2) is based on the following data

From junction to ambient	$R_{th\ j\text{-}a}$	=	55 K/W

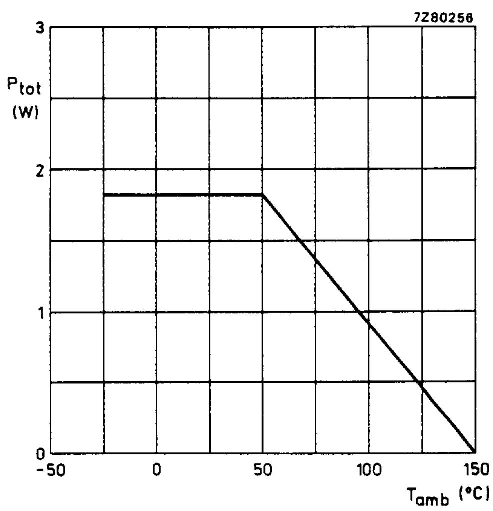


Fig.2 Power derating curve.

CHARACTERISTICS

V_P = 6 V; R_L = 4 Ω; f = 1 kHz; T_{amb} = 25 °C; measured in test circuit Fig.1; unless otherwise specified

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Supply (pin 3)					
V_P	Supply voltage	3,6	6	15	V
	Supply current; total quiescent				
I_{tot}	at V_P = 6 V	–	10	–	mA
Power amplifier					
	Output power at d_{tot} = 10%; see note 1				
P_o	V_P = 6 V	–	1	–	W
P_o	V_P = 9 V	–	2	–	W
G_c	Closed loop voltage gain	–	36	–	dB
d_{tot}	Total harmonic distortion at P_o = 0,5 W	–	–	1	%
$\|Z_i\|$	Input impedance	0,5	–	–	MΩ
RR	Ripple rejection at f = 100 Hz (R_S = 0 Ω)	40	50	–	dB
	Noise output voltage (r.m.s. value)				
$V_{n(rms)}$	R_S = 0 Ω; B = 60 Hz to 15 kHz	–	90	200	μV
	Noise output voltage at 500 kHz				
V_n	R_S = 0 Ω; B = 5 kHz	–	8	–	μV
Preamplifier					
G_o	Open loop voltage gain at f = 10 kHz	70	78	–	dB
G_c	Closed loop voltage gain	–	52	–	dB
	Minimum closed loop voltage gain				
$G_{c\ min}$	(when changing R_f)	35	–	–	dB
V_o	Output voltage at d_{tot} = 1%	1	–	–	V
	Output voltage with A.L.C.				
V_o	V_i = 2 mV	0,45	0,5	0,55	V
	Total harmonic distortion with A.L.C.				
d_{tot}	V_i = 2 mV	–	–	1	%
d_{tot}	V_i = 360 mV	–	–	3	%
	Signal-to-noise ratio related to V_i = 1,2 mV;				
S/N	R_S = 1 kΩ; B = 60 Hz to 15 kHz	–	60	–	dB
$\|Z_i\|$	Input impedance	100	–	–	kΩ
	Ripple rejection				
RR	at f = 100 Hz; R_S = 0 Ω	50	54	–	dB
$\|Z_o\|$	Output impedance; see note 2	–	–	50	Ω

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Automatic Level Control (A.L.C.) (see Fig.3); see note 4					
ΔG_v	Gain variation for ΔV_i = 45 dB	–	2	3	dB
t_l	Limiting time; see note 3	–	–	50	ms
t_s	Level setting time; see note 3	–	–	50	ms
t_r	Recovery time; see notes 3 and 5	–	100	–	s
Voltage stabilizer					
$V_{11\text{-}15}$	Output voltage	–	2,6	–	V
I_{11}	Load current	–	–	1,5	mA
RR	Ripple rejection at f = 100 Hz	40	–	–	dB

Notes

1. Measured with an ideal coupling capacitor connected to the speaker load.
2. I_P (effective value) must not exceed 1 mA.
3. At ΔV_i = dB with respect to V_i = 1,2 mV.
4. The A.L.C. tracking in stereo has a typical spread of 1 dB if pins 6 of both ICs are connected to the same RC network.
5. Without a shunt resistor across A.L.C. With 1 MΩ or 2,2 MΩ across A.L.C. recovery time becomes 22 or 50 seconds.

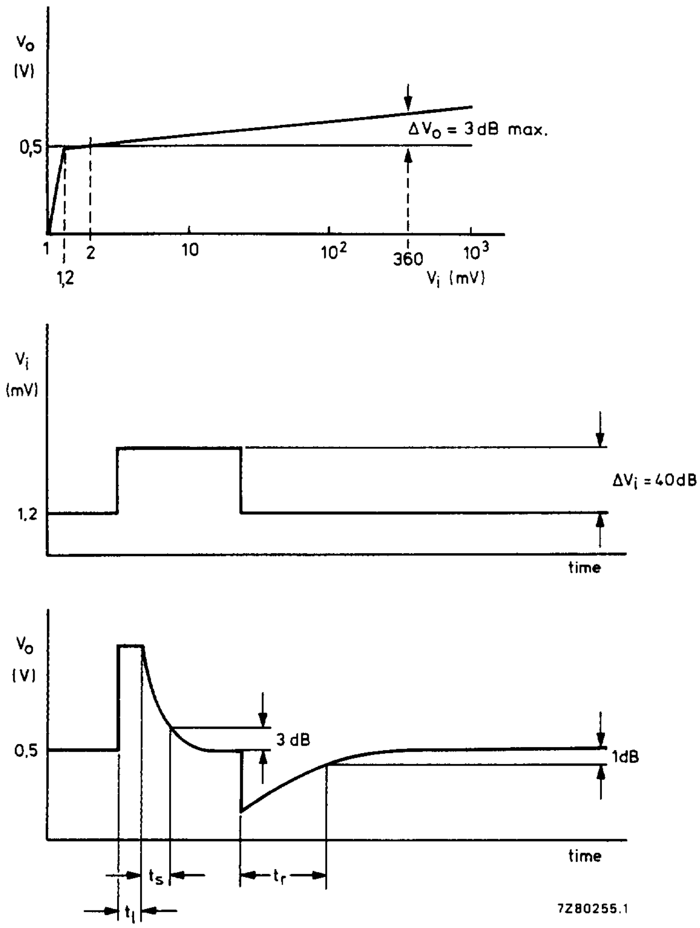
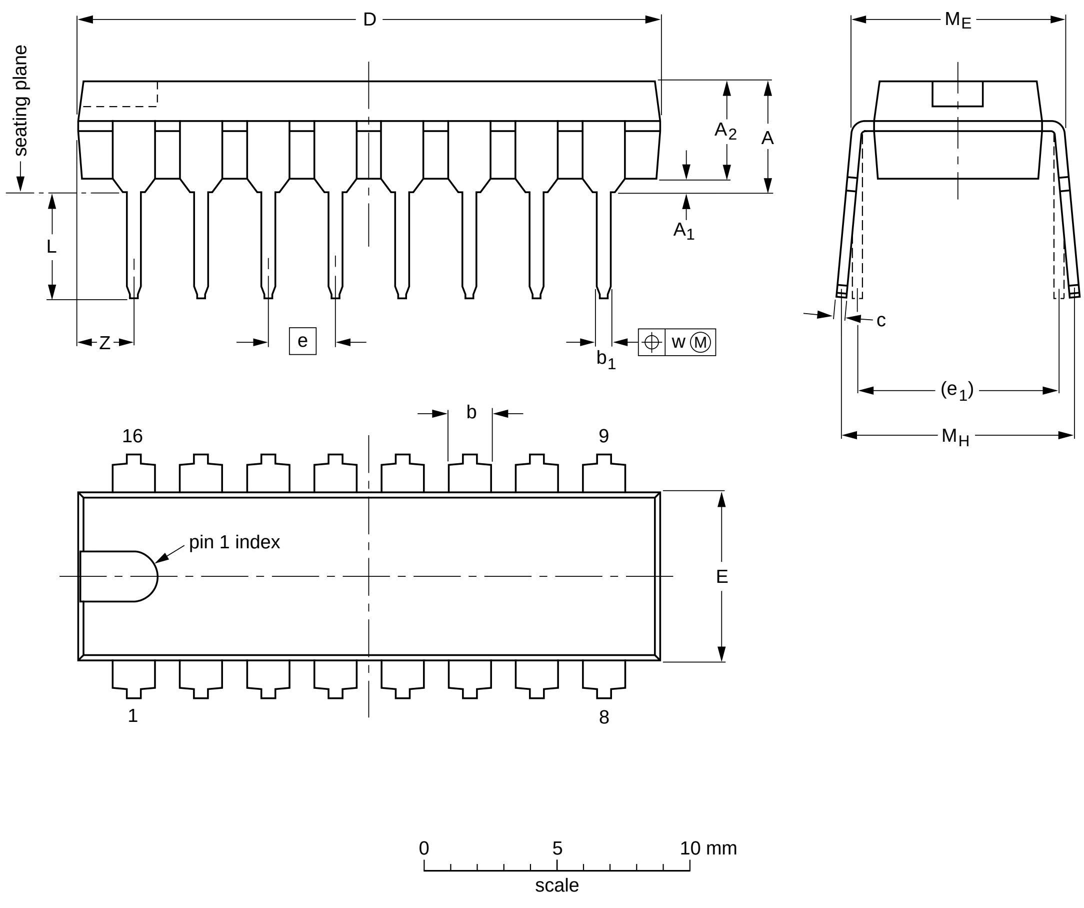


Fig.3 Typical A.L.C. curve with R_S = 10 kΩ.

PACKAGE OUTLINE

DIP16: plastic dual in-line package; 16 leads (300 mil); long body **SOT38-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.7	0.51	3.7	1.40 1.14	0.53 0.38	0.32 0.23	21.8 21.4	6.48 6.20	2.54	7.62	3.9 3.4	8.25 7.80	9.5 8.3	0.254	2.2
inches	0.19	0.020	0.15	0.055 0.045	0.021 0.015	0.013 0.009	0.86 0.84	0.26 0.24	0.10	0.30	0.15 0.13	0.32 0.31	0.37 0.33	0.01	0.087

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT38-1	050G09	MO-001AE				~~92-10-02~~ 95-01-19

SOLDERING

Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our *"IC Package Databook"* (order code 9398 652 90011).

Soldering by dipping or by wave

The maximum permissible temperature of the solder is 260 °C; solder at this temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified maximum storage temperature ($T_{stg\ max}$). If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

Repairing soldered joints

Apply a low voltage soldering iron (less than 24 V) to the lead(s) of the package, below the seating plane or not more than 2 mm above it. If the temperature of the soldering iron bit is less than 300 °C it may remain in contact for up to 10 seconds. If the bit temperature is between 300 and 400 °C, contact may be up to 5 seconds.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.